

SAFETY MANUAL— READ FIRST!

IMPORTANT: READ THESE WARNINGS AND SAFETY PRECAUTIONS PRIOR TO INSTALLATION OR OPERATION. FAILURE TO COMPLY WITH THESE INSTRUCTIONS COULD RESULT IN PERSONAL INJURY AND OR PROPERTY DAMAGE. RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE.

⚠ WARNING Pump, valves and all containers must be properly grounded prior to handling flammable fluids and/or whenever static electricity is a hazard.

⚠ WARNING Prior to servicing the pump, ensure that the air and fluid lines are closed and disconnected. While wearing personal protective equipment, flush, drain and process liquid from the pump in a safe manner.

⚠ CAUTION Do not connect a compressed air source to the exhaust port of the pump.

⚠ CAUTION Ensure that the muffler is properly installed prior to pump operation.

⚠ CAUTION Do not lubricate air supply.

⚠ CAUTION When selecting pump materials, be aware of the following temperature limitations:

Buna-N (Nitrile):	10°F to 180°F (-12C to 82C)
Geolast®:	10°F to 180°F (-12C to 82C)
EPDM:	-40°F to 280°F (-40C to 138C)
Santoprene®:	-40°F to 225°F (-40C to 107C)
Viton® (FKM):	-40°F to 350°F (-40C to 177C)
PTFE:	40°F to 220°F (4C to 104C)
Polyethylene:	32°F to 158°F (0C to 70C)
Polypropylene:	32°F to 180°F (0C to 82C)
PVDF:	0°F to 250°F (-18C to 181C)
Nylon:	0°F to 200°F (-18C to 93C)

Temperature limits are solely based upon mechanical stress and certain chemicals will reduce the maximum operating temperature. Consult a chemical resistance guide for chemical compatibility and a more precise safe temperature limit. Always use minimum air pressure when pumping at elevated temperatures.

⚠ WARNING = Hazards or unsafe practices which could result in severe personal injury, death or substantial property damage

⚠ CAUTION = Hazards or unsafe practices which could result in minor personal injury, product or property damage.

⚠ CAUTION Do not exceed 120 psig (8.3 bar) air-inlet pressure.

⚠ CAUTION Ensure all wetted components are chemically compatible with the process fluid and the cleaning fluid.

⚠ CAUTION Ensure pump is thoroughly cleaned and flushed prior to installation into a process line.

⚠ CAUTION Always wear Personal Protective Equipment (PPE) when operating pump.

⚠ CAUTION Close and disconnect all compressed air and bleed all air from the pump prior to service. Remove all process fluid in a safe manner prior to service.

⚠ CAUTION Blow out all compressed air lines in order to remove any debris, prior to pump installation.

⚠ CAUTION Ensure air exhaust is piped to atmosphere prior to a submerged installation.

⚠ CAUTION Ensure all hardware is set to correct torque values prior to operation.

⚠ CAUTION Ensure that the selected pump model number is made from the correct material and matches that which was ordered.

INSTALLATION

Notice: Re-torque fasteners prior to use. Refer to torque requirements listed in maintenance manual and attached to pump.

1. A lube-free, clean, dry compressed air source (or any nonflammable, compressed gas) is recommended. Use a filter that is capable of filtering out particles larger than 50 microns.
2. All pumps should be mounted in an upright position with the exception of the 1/4" models which may be rotated 360° to suit the application.
3. When particles exceed the maximum particle specification of the pump or are sharp enough to cut elastomers install a particle fluid filter on the fluid suction line.
4. Fluid suction lines and air exhaust lines should never be smaller than specified pipe size of the pump.
5. Apply PTFE (Teflon®) tape to threads upon assembly to prevent leakage.
6. Never use pipe dope on air line connections.
7. Never use collapsible tube on fluid inlet.
8. Do not exceed 10 ft-lbs of torque on plastic pipe threads.
9. If changing to a different application reconfirm compatibility of fluid.

SUBMERGED APPLICATIONS

1. Fluid must be compatible with fasteners and intermediate material.
2. Pipe exhaust above the level of the fluid.

HIGH VISCOSITY APPLICATIONS

1. Position the pump close to or below the level of the fluid source
2. Suction lines should be increased in size - up to three times the size of the inlet manifold. Dual manifolds may be used when available.
3. Start the pump slowly using a valve on the air line.

LOW TEMPERATURE AND UV EXPOSURE

1. Polypropylene tends to embrittle at freezing temperatures. Pump must be insulated or heated, otherwise use pumps with different materials of construction.
2. If excessive icing occurs at the pump exhaust, air source must be dried using mechanical means or through the introduction of ethyl alcohol in the air line.
3. UV rays will damage polypropylene pumps, either shroud the pumps from UV rays or use pumps with UV stabilized materials.

GENERAL MAINTENANCE

1. Check periodically for product or air leakage. Tighten any joint where leakage is occurring.
2. When pumping hazardous or toxic materials, diaphragms should be replaced at regularly scheduled intervals based upon pump usage.
3. In freezing temperatures, the pump must be completely drained when idle.
4. When pumping highly abrasive fluids reduce discharge flow rate or reduce air pressure to prolong diaphragm life.
5. If you are pumping a material that will settle or compact, the pump must be flushed before shut down.

TROUBLE SHOOTING

AIR IS APPLIED TO PUMP BUT PUMP IS NOT STARTING

1. Clean filters and debris from all fluid lines.
2. Make sure all valves on fluid lines are open.
3. Inspect diaphragms for rupture.
4. Air pressure must not be below 20 psi (1,3 bar).

PUMP IS PUMPING BUT NOT PRIMING

1. Check all suction line connections for leakage.
2. Inspect check valves for wear or debris.
3. Suction lift specifications may be exceeded.
4. If fluid is viscous use larger suction lines.

LEAKAGE

1. Retorque all fasteners to specified torque requirements.
2. Replace o-rings.
3. Inspect diaphragms for rupture.

LOW FLOW RATE

1. Confirm air pressure and air capacity at the air valve as required.
2. Check for leaks in suction line or obstructions in lines.
3. If fluid is viscous use larger lines.
4. Viscosity of fluids may have increased if temperature is lower.

AIR IN DISCHARGE LINES

1. Check for leaks in suction lines.
2. Inspect diaphragms for rupture.

ERRATIC CYCLING

1. Inspect check valve seats for debris.
2. Inspect fluid lines for debris.
3. Automatic valves must be properly functioning.
4. Viscosity of product may be changing.

PREMATURE DESTRUCTION OF WETTED COMPONENTS

1. If fluid is abrasive, slow down pump or increase size of pump.
2. Filter fluid for sharp objects.
3. Make sure fluid is compatible with wetted materials.

1" CLASSIC PERFORMANCE MAINTENANCE MANUAL

CHECK VALVE AND O-RING MAINTENANCE

1. Flush and neutralize the pump to be certain all corrosives or hazardous materials are removed prior to any maintenance. This procedure should always be followed when returning pumps for factory service also.
2. Remove the nuts (24) and washers (25) from the four long pumping cap screws (35). Suction check valve seats (26) and check balls (27) are located inside of the bottom of the outer chamber (28). Gently remove and inspect for excessive wear, pitting or other signs of degradation. Inspect valve seat o-rings (22). Replace if necessary. Discharge check valves are located inside of the bottom of the discharge elbows (32). Repeat procedure for discharge check valves.
3. To inspect the manifold o-rings (22) remove the band clamps (20) on either side of the manifold (21) evaluate and replace if necessary. Then reassemble the manifold assemblies. Lightly tighten fasteners making sure that two tension washers (9) have been put into place under nuts. Concave side of tension washers should face each other. Tighten all external fasteners to final torque requirement after pump is completely assembled. The check ball should fit into the curved portion of the valve seat and be facing upward when reinserted into the valve seat location.

NOTE: When using pumps built with PTFE o-rings always replace with new PTFE o-rings, since the original o-rings will not reseal the pump. PVDF pumps need additional gaskets (34). These gaskets are adhesive backed. Remove paper backing and apply to upper surface of valve seats as shown.

DIAPHRAGM AND PILOT SLEEVE ASSEMBLY MAINTENANCE

4. To inspect diaphragms remove the band clamps (16) from the outer pumping chambers (28). If replacement is necessary due to abrasion or rupture unscrew the outer diaphragm plates (29). Models that are built with PTFE elastomers will have a PTFE overlay (30) that faces the outer pumping chamber and a back-up diaphragm (31) on the air side of pump. Pumps without PTFE will contain only the back-up diaphragms.
5. If there has been a diaphragm rupture and corrosive or viscous fluid has entered the air side of pump the complete air system should be inspected. After removing diaphragms and inner diaphragm plate (33), the pilot sleeve assembly (14, 42, 45-48) and diaphragm rod assembly (13, 15) may be removed by removing the retaining plates (49) (you may only need to remove one retaining plate) and pushing the entire unit out through the bore in the intermediate (41). Diaphragm rod assembly must be unscrewed to remove pilot sleeve.
NOTE: To aid in reassembly use a non-synthetic, petroleum based lubricating grease without EP additives. Carleton-Stuart MagnaLube G is recommended.
6. Clean or replace any components that have excessive wear, dirt build-up, or chemical attack. Lube all components prior to reassembling. Reassemble pilot sleeve spacers, o-rings and lip seals (48) within bore of intermediate. Make sure that the open side in the lip seals is facing outward toward the diaphragms. Also make sure that the end pilot spacers (14) are at the end on either side of the pilot sleeve assembly and all inner spacers (47) are separated by o-rings (46). Next carefully insert the diaphragm rod assembly with pilot sleeve inside the assembly in the bore. Reattach retaining plates. Screws (38) are self tapping. Do not over tighten.
7. Assemble diaphragm (and optional PTFE overlay) and inner diaphragm plate onto outer diaphragm plate stud. Then screw assembly into diaphragm rod. Push diaphragm rod to opposite side of intermediate and add the opposite diaphragm assembly. **Apply 165 in-lbs. (18,65 NM) of torque to outer diaphragm plates.**
8. Position outer diaphragm chambers onto intermediate making sure that witness lines are matching.

NOTE: If air valve has been removed, proper orientation of air system with fluid chambers must be observed. The top of the intermediate has a single vertical air passage slot on the air valve mounting face while the outer chamber check ball cavity should be pointing downward.

9. When positioning band clamps use soapy water or a compatible lubricating spray on the inside of band clamps to aid assembly. Tap with a mallet on the outside of clamp to help position the clamp while tightening the fasteners. The band clamp fasteners are stainless steel. To prevent galling always apply an anti-seize compound to the thread. Apply light torque to fasteners and level and realign pump prior to applying final torque.
10. Position the reassembled manifolds making sure of the proper orientation in relation to the air valve for your application. Also make sure that the valve seat o-rings do not shift from their grooves during reassembly. Lightly tighten fasteners on long pumping chamber bolts making sure that two tension washers (9) have been put into place under nuts. Concave side of tension washers should face each other.

EXTERNAL FASTENER TORQUE REQUIREMENTS

NOTE: When reassembling loosely tighten all external fasteners adjusting and aligning and gradually, in an alternating fashion, tighten to torque requirements listed below.

AIR VALVE CAP SCREWS, 40 in-lbs (4,52 NM)
BAND CLAMPS (Outer Chamber), 16.7 ft-lbs (22,6 NM)
BAND CLAMPS (Manifolds), 80 in-lbs (9,04 NM)
OUTER CHAMBER CAP SCREWS, 20 in-lbs (2,26 NM)

AIR VALVE MAINTENANCE

11. To evaluate air valve components, remove the four cap screws (11), washers, (8, 10) and nuts from the air valve body (7). The valve plate (5) and shuttle (6) may be inspected by removing them from their location in the slot in the back of the air valve. Inspect for scratches or surface irregularities. Replace if necessary. To remove the plug (1) at the bottom of the air valve, point the bottom of the air valve safely away from people, direct compressed air through one of the lower holes in the back of the air valve body and the plug will shoot out. Next push the air valve spool (2) out of the air valve body. Gently reach in and pull lip seals (43) out of inside bore of the air valve body. Check for cracks, splitting or scratches. Clean components if replacement is not necessary. Inspect plug o-ring (44) for any damage and replace if necessary and reinsert in o-ring groove.
NOTE: Make sure that the open sides of the two lip seals face each other when reassembling air valve. Lube all components with suggested maintenance grease as an aid in reassembly.
12. Reinsert air valve spool inside of air valve body. Place shuttle on middle rib of air valve spool through the square slot in back of air valve. If using original valve plate lubricate side of plate that was facing the shuttle (or if new valve plate is used lubricate the lapped and polished side of plate) and place the lubricated side next to the shuttle in the slot. Press valve plug into air valve body, chamfered end first.
13. Check that gaskets (3, 4) are not cracked. If damaged replace.
14. After gaskets are pressed back into position align air valve onto intermediate and reinsert the four cap screws with lock washer and flat washers. **Apply 40 in-lbs (4,52 NM) of torque to fasteners.**

DUAL MANIFOLD CAPABILITY

1. Remove the four long pumping chamber cap screws along the sides of the pump.
2. Remove existing manifolds.
Note: There is a female 1" NPT thread inside the elbows.
3. Rotate elbows 180° and realign and secure pumping chamber cap screws.
4. Pump is now ready for dual side suction and discharge through the elbows.

SPECIFICATIONS

CAPACITY:

Adjustable 0-40 GPM (152 LPM)

MAXIMUM TEMP:

PVDF models – 200°F (93°C)

Other models – 150°F (66°C)

Metallic models – 200°F (93°C)

MAXIMUM AIR PRESSURE: 100 psi (6,8 bar)

MINIMUM AIR PRESSURE: 20 psi (1,3 bar)

DRY LIFT:

Models with PTFE balls – 10 feet (3 meters)

Other Models – 15 feet (4,5 meters)

WEIGHT:

PVDF – 22 pounds (9,9 kg)

Other Non-Metallic – 19 pounds (8,6 kg)

Stainless Steel – 42 pounds (19,1 kg)

Aluminum – 19 pounds (8,6 kg)

MAXIMUM SOLIDS:

1/4" (3,2 mm)

AIR SUPPLY:

Inlet – 1/4" NPT Female (BSP compatible)

Outlet – 3/4" NPT Female

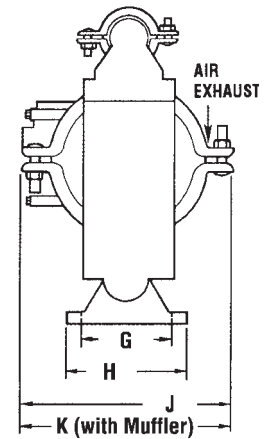
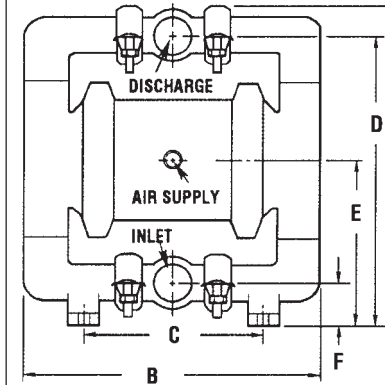
FLUID INLET/DISCHARGE:

1" NPT Female (BSP compatible)

DIMENSIONS

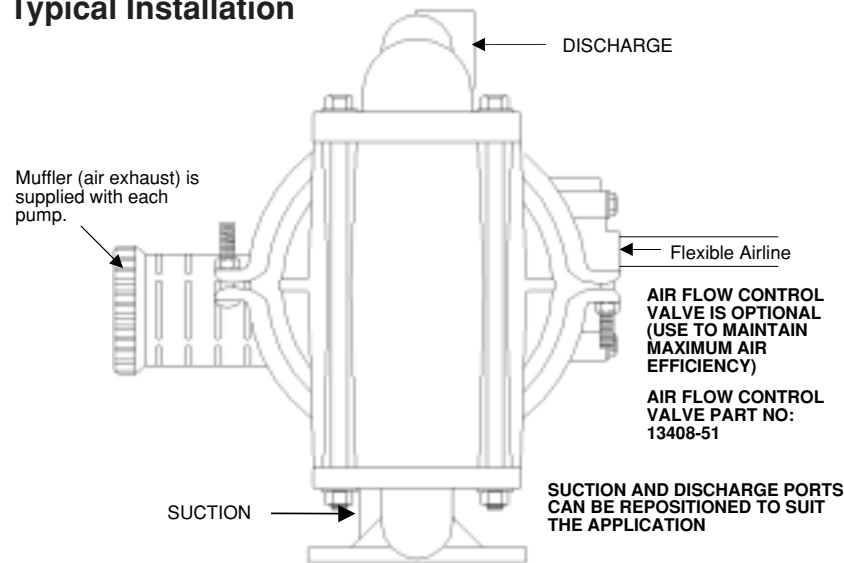
Dimensions in inches and (mm)

	Non-metallic	Metallic
A	15.00 (381)	12.69 (322)
B	12 (305)	12 (305)
C	5.75 (146)	6.75 (171)
D	13.50 (343)	11.78 (299)
E	8.30 (211)	5.68 (144)
F	2.00 (51)	1.44 (37)
G	5.0 (127)	4.18 (106)
H	6.0 (152)	5.0 (127)
J	9.9 (251)	9.30 (236)
K	11.56 (293)	11.56 (293)



Dimensions in inches and (mm), BSP Threads available on request, Air Exhaust (rear).

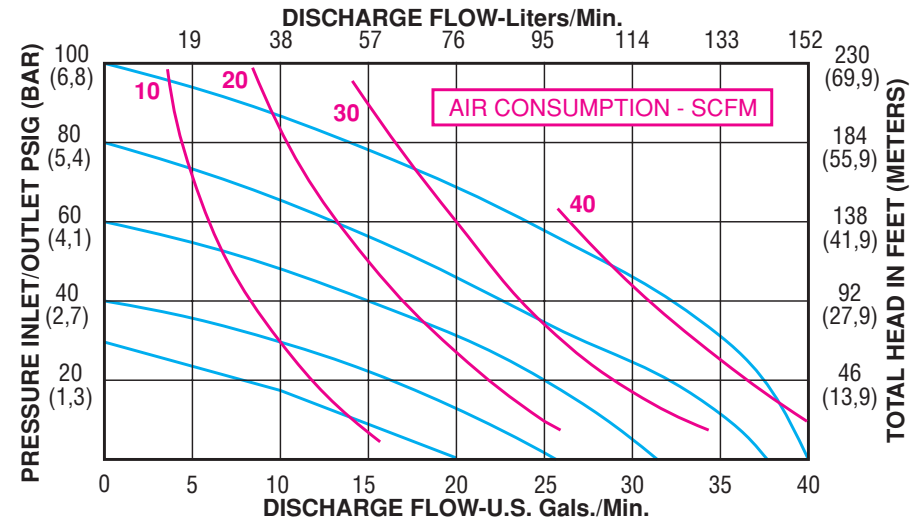
Typical Installation



DO NOT USE AIR LINE LUBRICATION

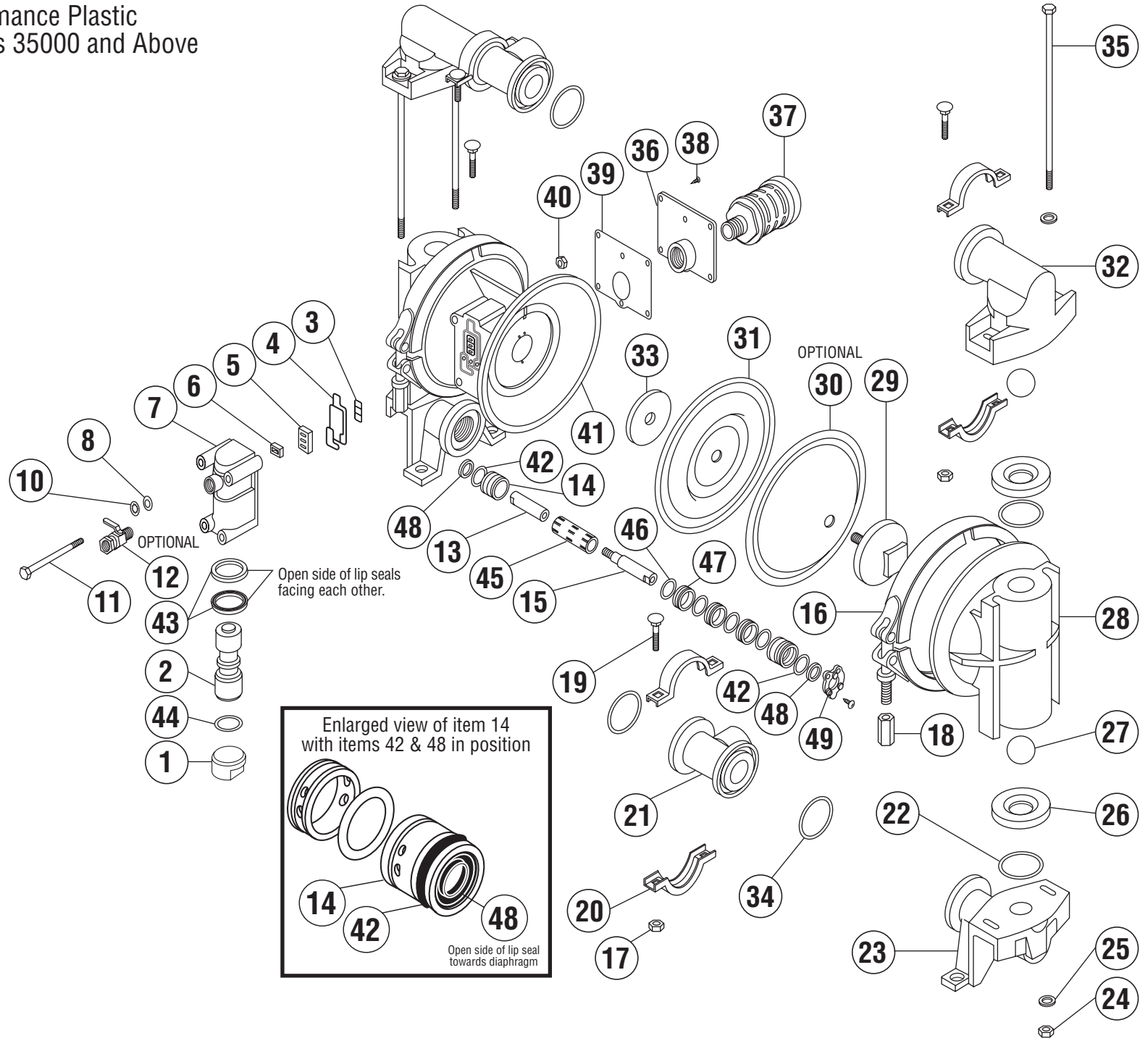
PERFORMANCE CURVE

(Based on water-flooded suction)



1" MODEL

Classic Performance Plastic
Serial Numbers 35000 and Above



1" CLASSIC PERFORMANCE PLASTIC MODELS

APRIL 2015

ITEM	DESCRIPTION	QTY PER PUMP	MODELS	PART NO	MATERIAL
1	AIR VALVE END PLUG	1	NC, BK, KN	11703-60	POLYPRO
2	AIR VALVE SPOOL	1	ALL MODELS	10407-31	ACETAL
3	GASKET, INNER	1	ALL MODELS	12103-11	NITRILE
4	GASKET, OUTER	1	ALL MODELS	12109-11	NITRILE
5	SHUTTLE PLATE	1	ALL MODELS	10403-77	CERAMIC
6	SHUTTLE	1	ALL MODELS	10409-00	SPECIAL
7	AIR VALVE BODY	1	NC, BK, KN	11608-60	POLYPRO
8	FLAT WASHER	4	ALL MODELS	12300-26	SS
10	LOCK WASHER	4	ALL MODELS	12350-26	SS
11	CAP SCREW (1/4" X 5")	4	ALL MODELS	12512-26	SS
12	AIR FLOW CONTROL VALVE (Optional)	1	NPT PORTS BSP PORTS	13400-30 13408-51	BRASS PVC
13	DIAPHRAGM ROD, SHORT	1	ALL MODELS	*	SS
14	END SPACER, PILOT SLEEVE	2	ALL MODELS	10204-40	POLYPRO
15	DIAPHRAGM ROD, LONG	1	ALL MODELS	*	SS
16	CLAMP, CHAMBER (Complete with fasteners)	2	ALL MODELS	12902-26	SS
17	HEX NUT (5/16" - 18)	8	ALL MODELS	12601-26	SS
18	HEX NUT (3/8" - 16 X .625")	2	ALL MODELS	12605-26	SS
19	CARRIAGE BOLT (5/16" X 1-1/2")	8	ALL MODELS	12509-26	SS
20	CLAMP, MANIFOLD (Complete with fasteners)	4	ALL MODELS	12903-26	SS
21	MANIFOLD, NPT THREADS	2	NC, BK KN	10506-40 10506-56	POLYPRO PVDF
	MANIFOLD, BSP THREADS	OPT OPT	NC, BK KN	10509-40 10509-56	POLYPRO PVDF
		4	NC	11910-11	NITRILE
22	O-RING, VALVE SEAT	4 EACH	BK (Twin O-rings)	11946-17	PTFE
				11953-17	PTFE
		4	BK-E	11910-15	EPDM
			BK-V	11910-13	VITON
			KN	11912-17	PTFE
KN-E	11912-15	EPDM			
KN-V	11912-13	VITON			
23	SUCTION ELBOW	2	NC, BK KN	10801-40 10801-56	POLYPRO PVDF
24	HEX NUT (3/8" - 16)	4	ALL MODELS	12602-26	SS
25	FLAT WASHER	8	ALL MODELS	12303-26	SS
26	VALVE SEAT	4	NC BK KN	10901-40 10931-40 10901-56	POLYPRO POLYPRO PVDF
		OPT	ALL MODELS	10901-26	316 SS
27	BALL HEAVY WEIGHT	4	NC	11002-19	GEOLAST
			BK, KN	11002-45	PTFE
			BK-E, KN-E	11002-23	SANTO
			BK-V, KN-V	11002-13	VITON
		OPT OPT	HIGH VISCOSITY ALL MODELS	11002-22 11002-26	NITRILE SS
28	OUTER CHAMBER	2	NC, BK KN	10702-40 10702-56	POLYPRO PVDF
29	OUTER DIAPHRAGM PLATE	2	NC, BK KN	11204-40 11204-56	POLYPRO PVDF

ITEM	DESCRIPTION	QTY PER PUMP	MODELS	PART NO.	MATERIAL
30	OVERLAY	2	BK,KN	11406-59	PTFE
31	DIAPHRAGM	2	NC BK,KN BK-E,KN-E	10605-19 10605-23 10605-23	GEOLAST SANTO SANTO
	BONDED ONE PIECE	OPT	BK-V, KN-V ALL MODELS	10605-13 10609-36	VITON SAN/PTFE
32	DISCHARGE ELBOW	2	NC,BK KN	11301-40 11301-56	POLYPRO PVDF
33	INNER DIAPHRAGM PLATE	2	ALL MODELS	11104-25	PS
34	O-RING, MANIFOLD	4	NC	11912-11	NITRILE
			BK,KN	11912-17	PTFE
			BK-E,KN-E	11912-15	EPDM
			BK-V,KN-V	11912-13	VITON
35	CAP SCREW (3/8" X 9 - 1/2")	4	ALL MODELS	12508-26	SS
36	MUFFLER PLATE	1	NC, BK, KN	13102-60	POLYPRO
37	EXTERNAL MUFFLER	1	ALL MODELS	13007-00	SPECIAL
38	SCREW (#6 X 1/2")	12	ALL MODELS	12510-26	SS
39	GASKET, MUFFLER PLATE	1	ALL MODELS	12102-10	FIBER
40	HEX NUT (1/4" - 20)	4	ALL MODELS	12600-26	SS
41	INTERMEDIATE	1	NC, BK, KN	11517-60	POLYPRO
42	O-RING, END SPACER	2	ALL MODELS	11923-11	NITRILE
43	AIR VALVE LIP SEAL	2	ALL MODELS	12003-76	NITRILE
44	O-RING, VALVE PLUG	1	ALL MODELS	11913-11	NITRILE
45	PILOT SLEEVE	1	ALL MODELS	10105-31	ACETAL
46	O-RING, PILOT SLEEVE	4	ALL MODELS	11920-16	URETHANE
47	INNER SPACER, PILOT SLEEVE	3	ALL MODELS	10203-40	POLYPRO
48	LIP SEAL, DIAPHRAGM ROD	2	ALL MODELS	12000-76	NITRILE
49	RETAINING PLATE	2	ALL MODELS	12708-40	POLYPRO

*** DIAPHRAGM ROD AVAILABLE ONLY AS AN ASSEMBLY**

DIAPHRAGM ROD ASSEMBLY Includes items 13 & 15	1	ALL MODELS	32000-00	SS
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OPTIONAL ASSEMBLIES AVAILABLE

AIR VALVE ASSEMBLY Includes items 1 thru 7,43,44	1	NC, BK, KN	40000-60	POLYPRO
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PILOT SLEEVE ASSEMBLY Includes items 14,42,45,46,47,48	1	ALL MODELS	41000-00	VARIOUS
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REPAIR KITS - WET END Includes items 22, 26, 27, 31 & (30 - Used in pumps built w/ PTFE) To order a wet end repair kit, add "KIT" to the pump model. e.g. NC-10 KIT				
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NOTES:

1. PS = PLATED STEEL, SS = STAINLESS STEEL